

ZEHAO JIN

Theoretical and Applied Mechanics & Aerospace Engineering
Xingjian College, Tsinghua University, P.R. China
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EDUCATION

Tsinghua University

2021.09 – Present

B.S. in Theoretical and Applied Mechanics & Aerospace Engineering

GPA: 3.81/4.00

Relevant Courses: Introduction to Complex Analysis(A+), Advanced linear Algebra (1)(A), Fluid Mechanics(A), Programming Fundamentals(A), Introduction of Mathematical Modelling (A)

Skills: Mathematical Modeling, Scientific Computing

Programming Languages: C/C++, Python, Java, HTML/CSS, Matlab, Mathematica

Language: TOEFL 103, IELTS 7.5

SELECTED AWARDS AND HONORS

- **Grand Prize**, "Capital Challenge Cup" Academic and Scientific Works Competition 2023
- **First Prize**, "Challenge Cup" Academic and Scientific Works Competition 2023
- **17th "Spark" Member**, University-level Innovation Talent Club 2023
- **Silver Award**, IAF-CSA Space Universities CubeSat Challenge (China) 2023
- **Technology Innovation Excellence Scholarship**, Scholarship of Tsinghua University 2023
- **Philobiblon Scholarship**, Scholarship of Tsinghua University 2023&2022
- **Ying-Hua Scholar Candidate**, University-level exchange student to Oxford University 2022
- **Finalist**, 2023 Interdisciplinary Contest In Modeling (ICM) 2022
- **Overall Excellence Scholarship**, University-level Scholarship of Tsinghua University 2022

RESEARCH EXPERIENCE

1. Neural Velocity Field

2023.10 – Present

Advisor: Prof. Pei Sun, Department of Psychology, Tsinghua Laboratory of Brain and Intelligence

Aims to develop a universal method and a research tool for analyzing the velocity field in the state space of complex systems. This involves employing Variational Autoencoders (VAE) to unsupervisedly learn low-dimensional representations of data, thereby investigating the dynamical representation of temporal information:

- Adapted a Transformer-like network based on wavelet theory into a VAE
- Successfully utilized this methodology on generated Meta Chimera State data
- Aspiring to employ the developed methodology for the analysis of Neuropixels dataset in the future

2. Research on sleep and dreams based on adaptive deep brain stimulation system

2022.04 – 2023.09

Advisor: Prof. Li Luming, president of Tsinghua University, IDG/McGovern Institute for Brain Research

Aims to study the mechanism of sleep modulation through the implementation of adaptive deep brain stimulation system (aDBS) to overcome traditional DBS's incapacity to Parkinson's patients' stimulation-induced impulsivity:

- Participated in clinical trials, mainly assisted pre-operative assessment and post-operative follow-up
- Analyzed kinematic data to identify subject's essential tremor pattern
- Developed an automatic sleep stage classification method using SVM and DNN

3. Design of a Wearable Tremor Analyser

2023.02 - 2023.03

Advisor: Prof. Li Luming, president of Tsinghua University, IDG/McGovern Institute for Brain Research

Developed a tremor analyser based on the ESP32 for real-time reading and analysis of hand tremor in Parkinson's patients, which is inspired by the *research on sleep and dreams based on adaptive deep brain stimulation system*:

- Proposed the project independently from practical problems encountered in research
- Developed ESP32-based embedded system
- Gained a practical understanding of the problems encountered in the manufacture of wearable devices

STUDY VISITS

National University of Singapore

Summer, 2023

Post: Research Assistant Intern

Adviser: Prof. Wu Changsheng, Department of Materials Science and Engineering, National University of Singapore

- Built a data processing platform to process the acceleration data collected with machine-acoustic sensors
- Participate in the development of a physiological sensor based on the Doppler effect

Xinstitute, Shenzhen China

Summer, 2022

Track: Cognitive Neuroscience led by Academician Steve Chen

Concentration: Early detection and treatment of brain diseases

- Learn the Introduction to Brain-Computer Interfaces (BCI), Digital Signal Processing, and the Fundamentals of cognitive neuroscience.
- Using Letswave7 Toolbox to process and analyse EEG data
- Led a group to initiate and implement a BCI-related project, winning the Best Sustainability Award

ADDITIONAL INFORMATION

Humanities and Social Sciences

- Completed literary review 'Living a moral life – Reading *Explaining Doubts in Ethics Education*', accepted by Yilin Press (译林出版社) 2022.07
- Writer of newsletter 'Lunamare', published 30+ original articles covering philosophy, book reviews, social criticism, etc. 2021.08 - Present

Volunteer Services

- Participated in Tsinghua University's International Volunteer Program "The Other Side Project", teaching and tutoring Chinese to students from Uganda. 2023.05